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7555-01-P

NATIONAL SCIENCE FOUNDATION

Request for Information; National Science Foundation's Directorate for Computer Information Science and Engineering

AGENCY: National Science Foundation.

ACTION: Request for information.

SUMMARY: Semiconductor-related research, including underlying supply-chain, business, and economic impacts, are increasingly important to the Nation's long-term competitiveness and security. Through this Request for Information (RFI), the National Science Foundation's (NSF) Directorate for Computer Information Science and Engineering (CISE) seeks input from those who are directly engaged in, or might potentially benefit from, CISE-related research and education in semiconductor and micro- and nano-electronics.

DATES: Please send comments on or before September 30, 2021. Comments received after that date will be considered to the extent practicable. Send comments to the address below.

ADDRESSES: Submit comments to Sankar Basu or Erik Brunvand, Program Directors, CISE_SemiWG@nsf.gov. National Science Foundation, 2415 Eisenhower Avenue, Suite E10241, Alexandria, Virginia 22314. Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1.800.877.8339, 24 hours a day, 7 days a week, 365 days a year (including Federal holidays).

SUPPLEMENTARY INFORMATION: The computing stack has traditionally been viewed as a hierarchy of layers with devices and circuits comprising the lowest

layers, and architectures, software, algorithms, and applications constituting progressively higher layers. Lower layers of the stack (e.g., devices, circuits, architectures) more directly involve semiconductor technologies to the extent that researchers may interact with large-scale fabrication facilities, but all levels of the stack are influenced by microelectronic advances to varying degrees. Thus, although in its entirety CISE research may not directly involve research on semiconductors, per se, the entire computing stack, from circuit design to architectures and on to software and applications such as sensor networks including the Internet of Things (IoT), embedded computing, next-generation wireless systems, large-scale data analytics, AI, edge and cloud computing, and high-performance computing, heavily depends on advances in this space.

As a result, much of the CISE directorate's portfolio is dependent upon advances in semiconductor technologies. For one example, tomorrow's artificial intelligence (AI) innovations offer transformative societal impacts, but require advanced hardware capabilities that leverage newer semiconductor technologies. Conversely, the hardware design problem is a large multi-objective, multiscale optimization problem that stands to benefit from the application of modern AI techniques.

Invitation to Comment: NSF invites comments from the public who are directly engaged in, or might potentially benefit from, CISE-related research and education in semiconductor and micro- and nano-electronics.

1.0 Background

On December 14-20, 2020, CISE funded a workshop focusing on the lowest levels of the computing stack. This workshop considered the scientific frontiers for semiconductor and microelectronics technologies as well as the

needs for access to semiconductor foundries (for details, see the workshop report at

https://nsfedaworkshop.nd.edu/assets/429148/nsf20_foundry_meeting_report.pdf

Building upon that workshop and report, and given the diverse interests of the CISE directorate and community, the intent of this RFI is broader. Specifically, NSF/CISE seeks to:

- Gauge the extent to which the community's research and educational agenda are handicapped, e.g., by unavailability of past or future resources. By this, NSF/CISE asks that respondents not restrict their answers to issues related to funding, but rather also consider issues related to infrastructure, facilities, access to tools/intellectual property/data, legal issues, etc., that support their research and educational agenda in the broader area of semiconductors;
- Understand what specific activities the research community would pursue and how that activity would impact societal and national interests, if the impediments mentioned in the first category above are removed. NSF/CISE asks respondents to be specific in making projections about new technologies potentially enabled by advances in semiconductor and microelectronics technologies within the 5-, 10-, or 15-year horizons, or longer.

2.0 Request for Information

This RFI is issued solely for information-gathering purposes. NSF/CISE's intent is to analyze the responses received from this RFI for internal needs and for potentially formulating future programmatics. NSF/CISE may make

anonymized versions of the responses available for public consumption. This RFI does not constitute a formal solicitation for proposals. To respond to this RFI, please use the official submission form available at https://www.surveymonkey.com/r/CISERFIonSemiconductorResearchandEducation.

(Authority: 42 U.S.C. 1861.)

Dated: June 28, 2021.

Suzanne H. Plimpton,

Reports Clearance Officer,

National Science Foundation.

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